

MAP DISPLAY DEVICE

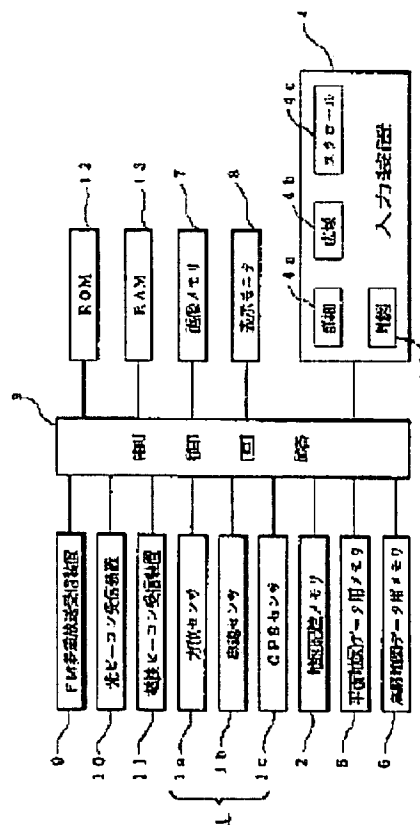
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Applicant: ZANAVY INFORMATICS KK
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 - european:
Application number: JP19960100363 19960422
Priority number(s): JP19960100363 19960422

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Abstract of JP9287960

PROBLEM TO BE SOLVED: To display characters without special operation when traffic information is received in both the graphics and the characters formats.

SOLUTION: In this map display device, a road map is displayed on a display monitor 8 from the map data stored in a map memory device 2, and the position of one's own vehicle is detected and displayed on the road map in the overlapped pattern at the same time. Then, it is judged whether or not the received traffic information is displayed on the display monitor 8 as the graphic information. When it is judged that the graphic information is displayed, the graphic information is selected, and the detailed contents of the information is displayed by the characters.



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るリンクL1とL2のオフセット方向は同一でもリンクL2の向きが反転する場合に必要となる。したがって、図22(d)、(e)のように、連続して接続されるリンクL1とL2のオフセット方向も向きも同一である場合には補間演算は不要である。

【0054】

【発明の効果】本発明によれば、交通情報の図形が表示画面上に表示されているときにその一つを選択するとともにその詳細内容を文字表示するようにしたので、特別な操作をすることなく、図形の詳細内容を知らしめることができる。

【図面の簡単な説明】

【図1】本発明による地図表示装置の一実施の形態を示すブロック図。

【図2】VICIS情報表示無しモードによる表示例を示す図。

【図3】メイン処理を示すフローチャート。

【図4】鳥瞰地図表示処理を示すフローチャート。

【図5】平面地図表示処理を示すフローチャート。

【図6】VICIS情報表示を設定する画面を示す図。

【図7】VICIS情報表示の設定途中の画面を示す図。

【図8】一般道路VICIS情報と有料道路VICIS情報の選択とそのときの表示内容を説明する図。

【図9】VICIS情報表示処理を示すフローチャート。

【図10】VICIS情報加工処理を示すフローチャート。

【図11】一般道路VICIS情報表示有りモードによる表示例を示す図。

【図12】有料道路VICIS情報表示有りモードによる表示例を示す図。

【図13】有料道路と一般道路VICIS情報表示有りモ

ードによる表示例を示す図。

【図14】VICIS情報詳細表示モードを説明する図。

【図15】VICIS情報詳細表示処理のフローチャート。

【図16】渋滞情報表示線の表示例を示す図。

【図17】渋滞情報表示線と道路との間隔を説明する図。

【図18】渋滞情報表示線と道路との間隔を説明する図。

10 【図19】渋滞情報表示線の作成を説明する図。

【図20】渋滞情報表示線が切断され交差することを説明する図。

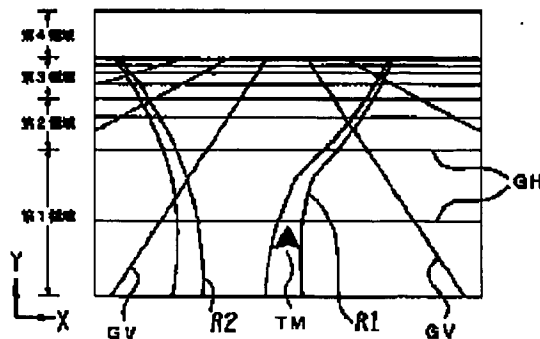
【図21】渋滞情報表示線の補間演算を説明する図。

【図22】渋滞情報表示線の補間演算の要否を説明する図。

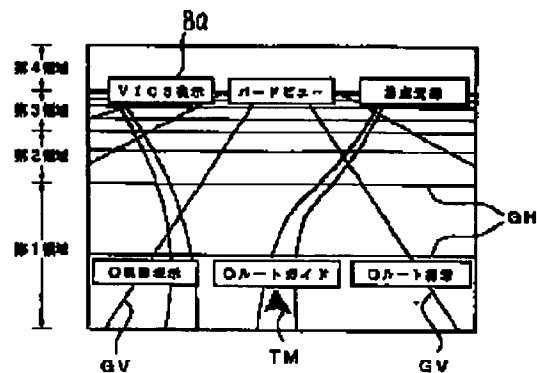
【符号の説明】

- 1 現在地検出装置
- 2 地図記憶メモリ
- 3 制御回路
- 20 4 入力装置
- 4a 詳細スイッチ
- 4b 広域スイッチ
- 4c スクロールスイッチ
- 5 平面地図データ用メモリ
- 6 鳥瞰地図データ用メモリ
- 7 画像メモリ
- 8 表示モニタ
- 9 FM多重放送受信装置
- 10 光ビーコン受信装置
- 30 11 電波ビーコン受信装置

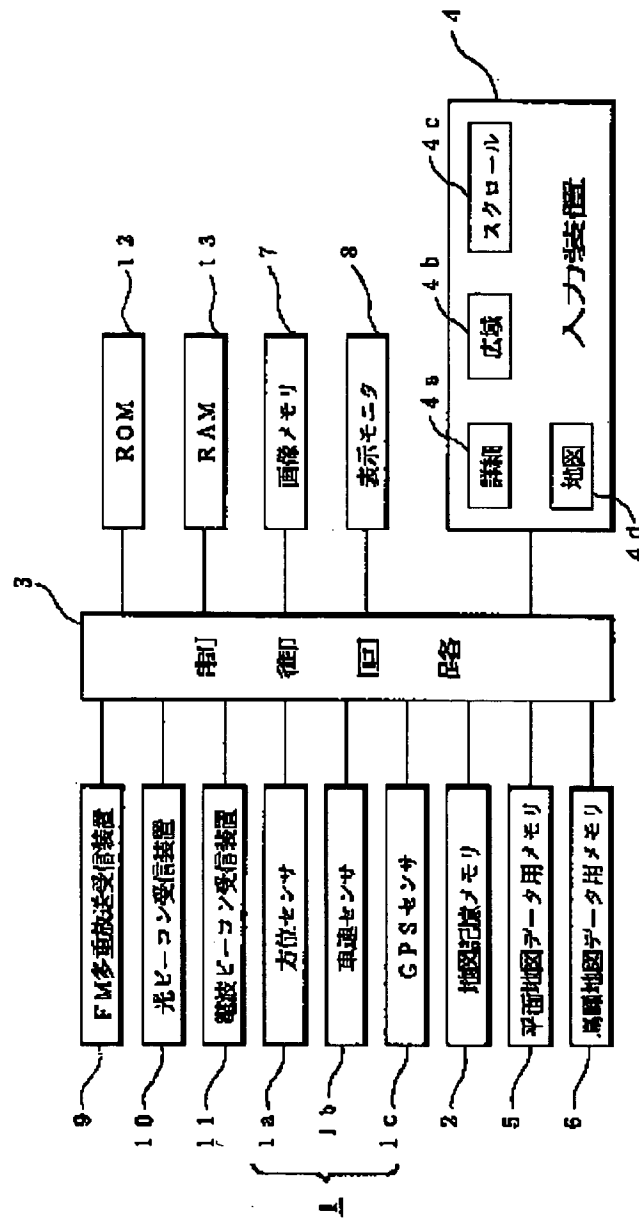
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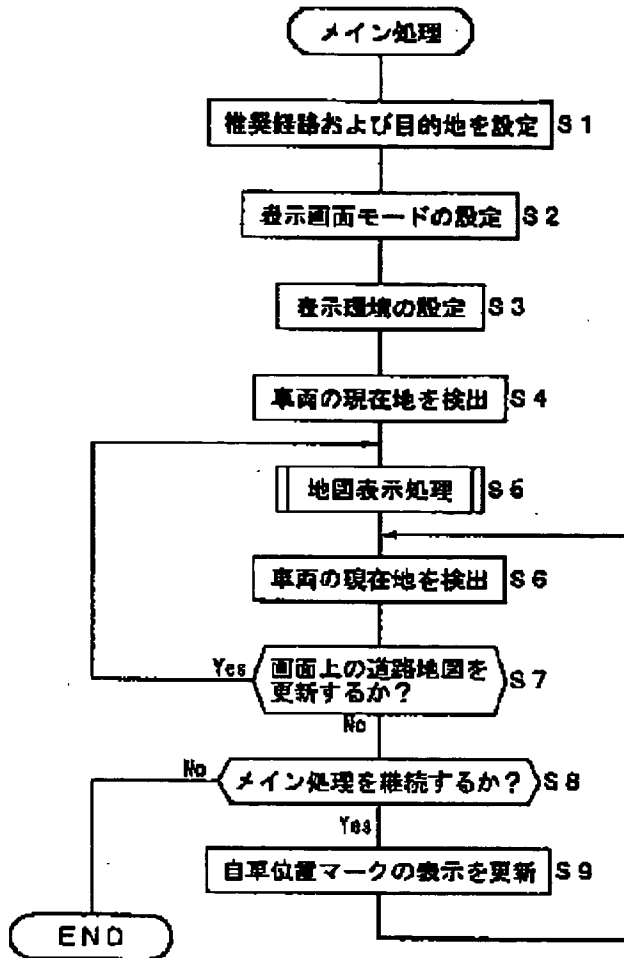
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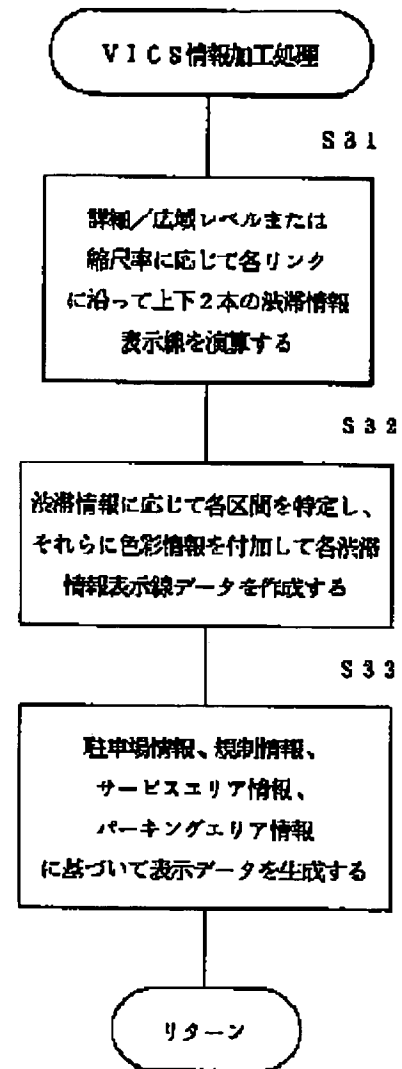
【図 1】



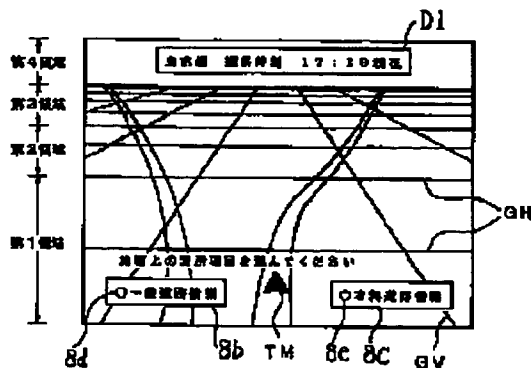
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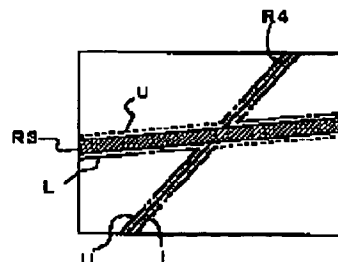
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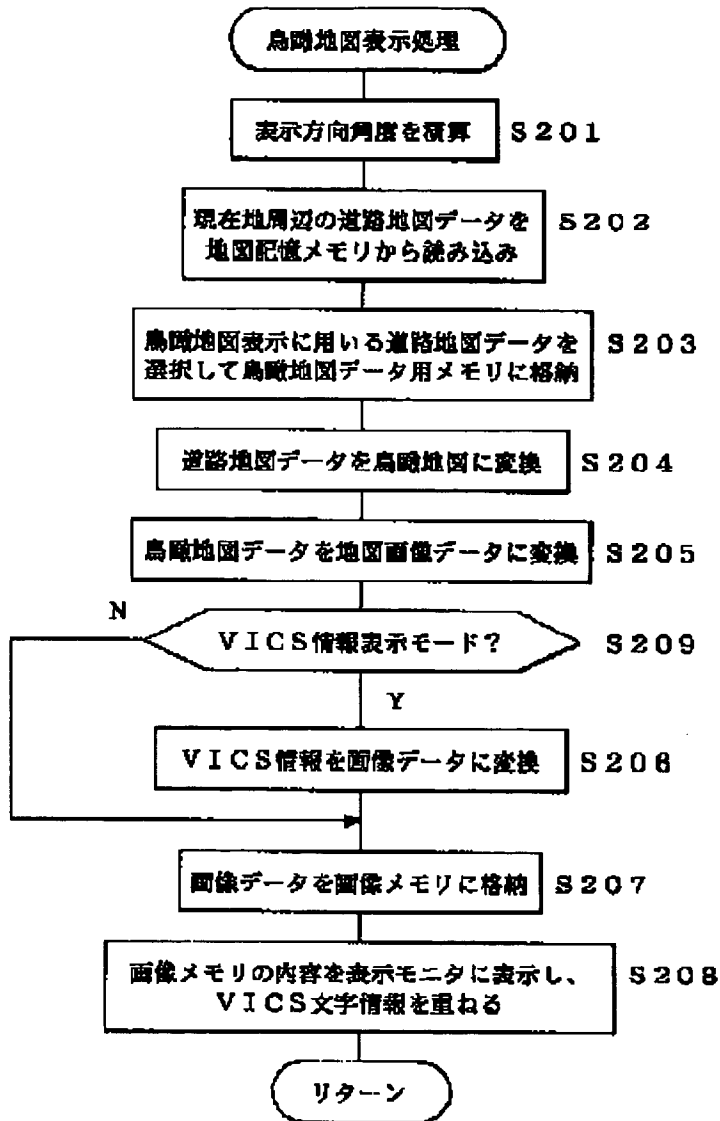
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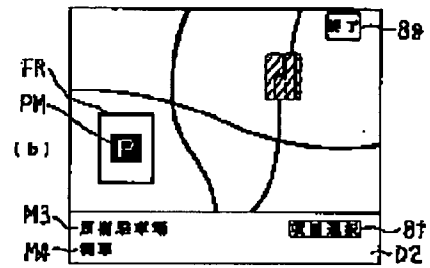
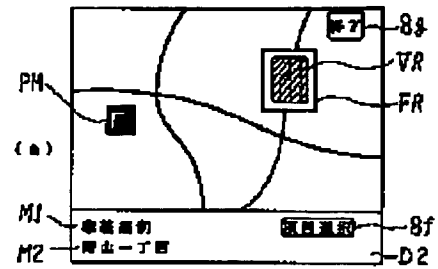
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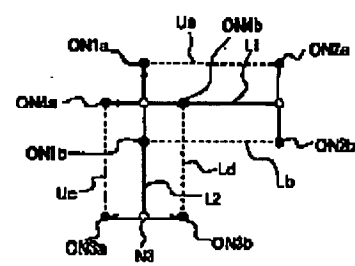
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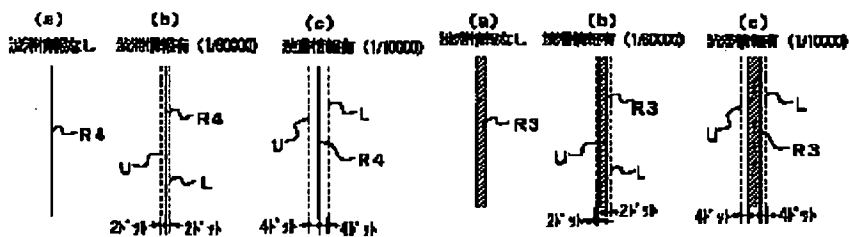
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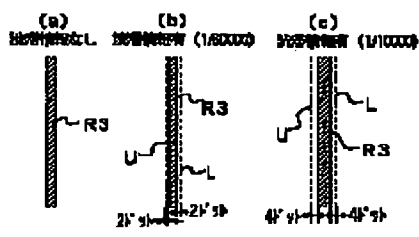
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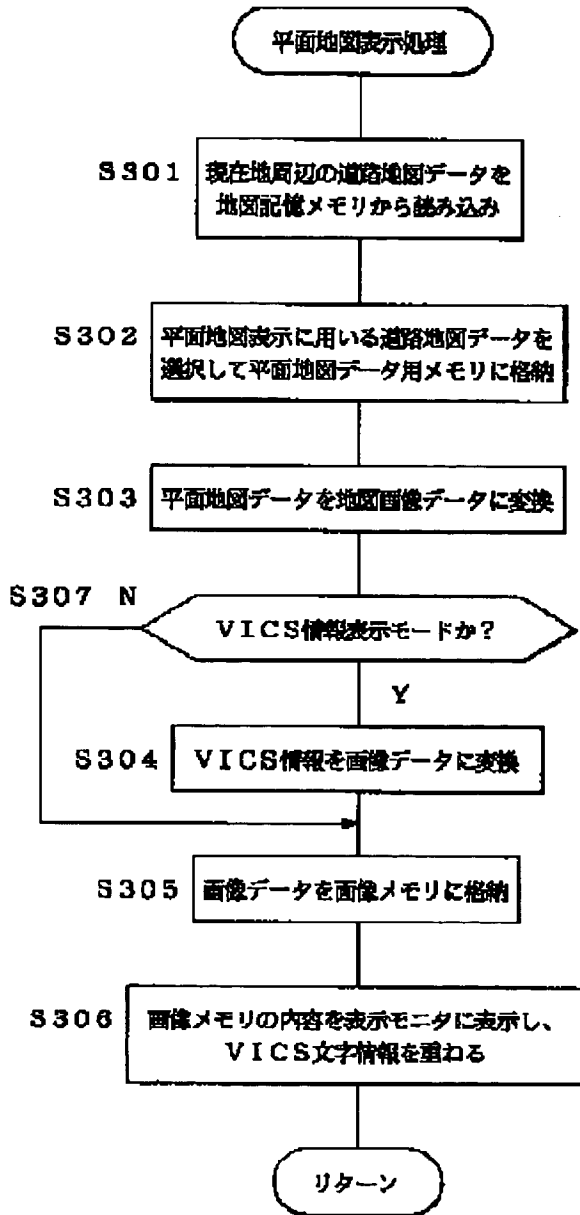
【図17】



【図18】



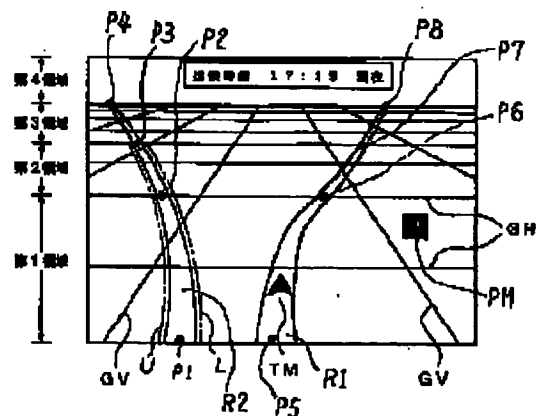
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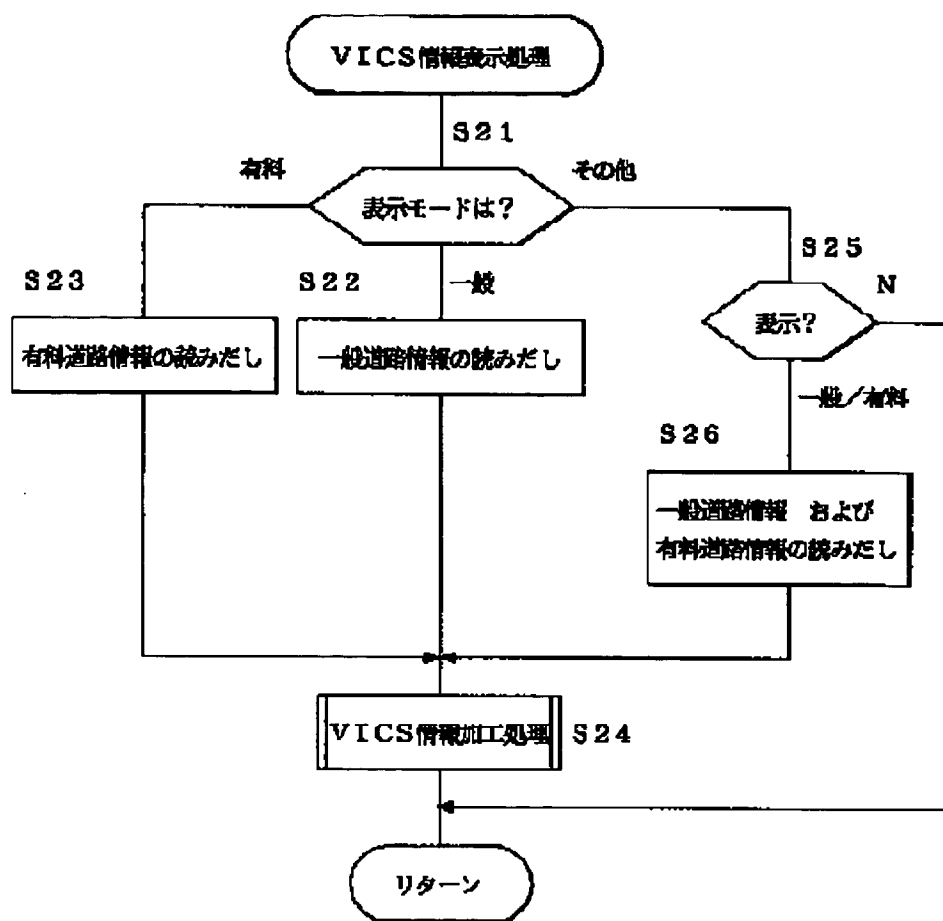
【図8】

一般道路情報スイッチ8b	有料道路情報スイッチ8c	VICIS情報
OFF	OFF	表示なし
OFF	ON	高速道路と有料道路の 閉塞情報および事故情報 カーブスミアと パーキングエリアの情報
ON	OFF	国道、県道、市町村道、 一般道1の渋滞情報、 渋滞情報および駐車情報
ON	ON	全道路の渋滞情報および 事故情報 カーブスミアと パーキングエリアの情報 駐車場情報

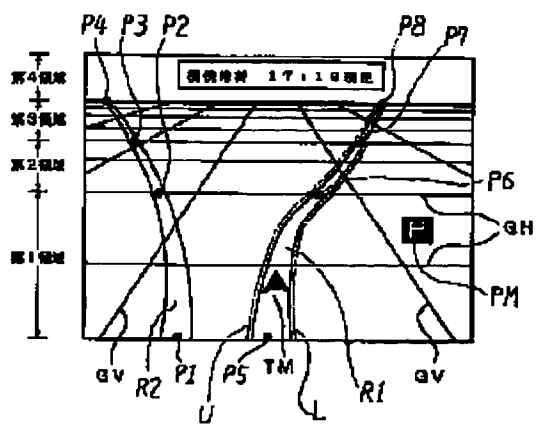
【図11】



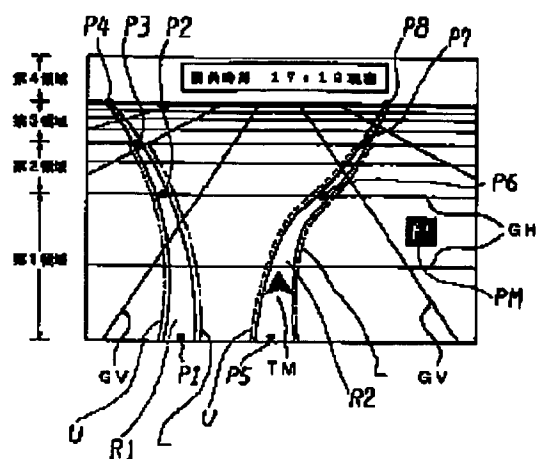
【図9】



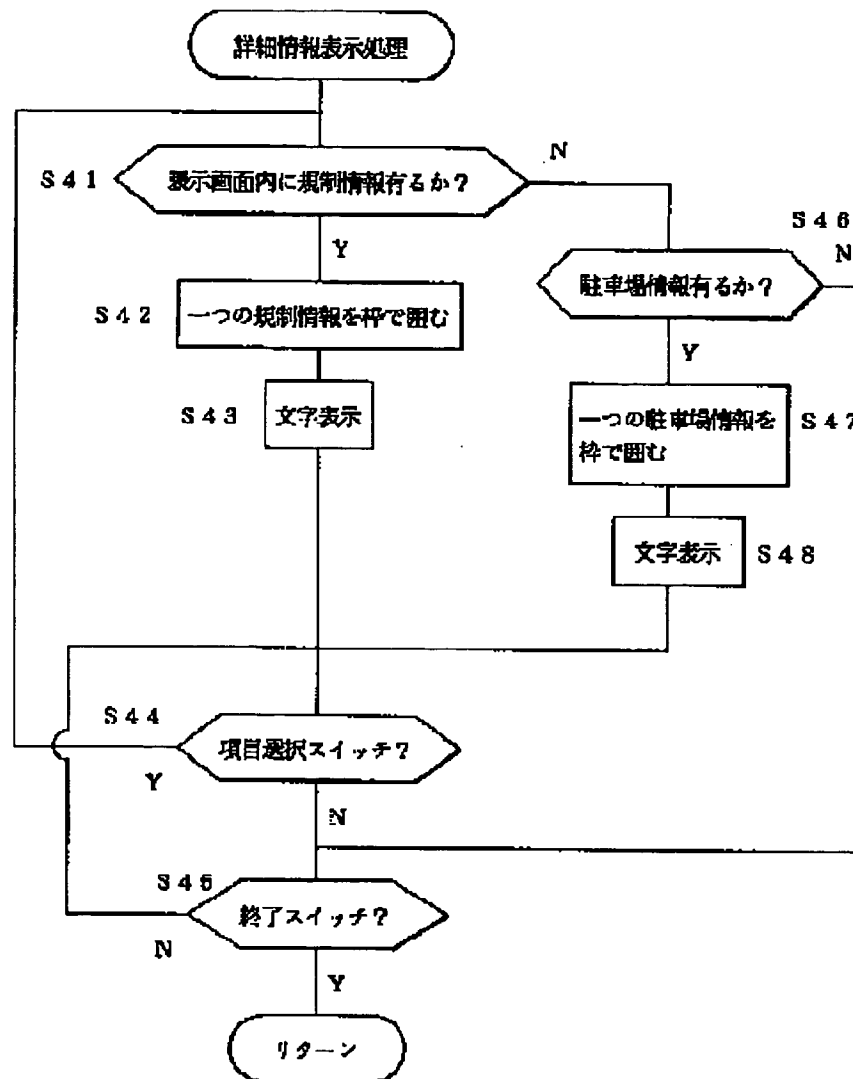
【図12】



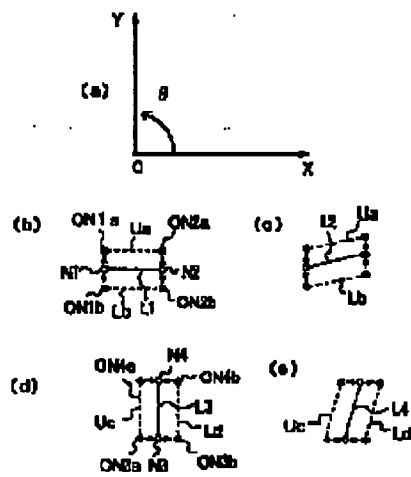
【図13】



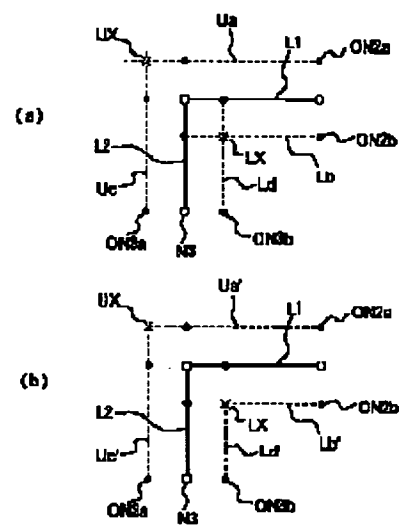
【図15】



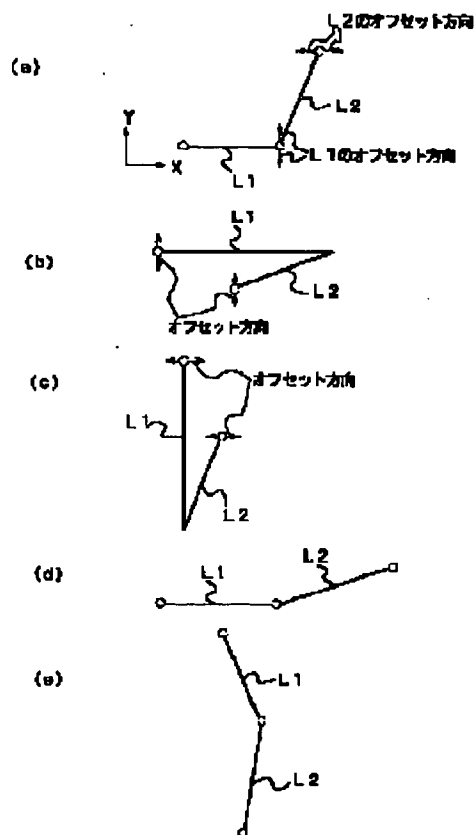
【図 19】



【図 21】



【図 22】



* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention carries out the graphic display of the regulation information of a lane or a lamp, or the information on a motor pool on the map currently displayed, and relates to the map display device which can carry out the character representation of the detailed content further.

[0002]

[Description of the Prior Art]The traffic information sent from an FM multiplex broadcast electric wave, a light beacon, or a radio wave beacon is diagrammatically displayed on a display screen, or the map display device displayed in written form is known. When one information comprises a form of a figure and a character and the contents of the figure are checked in written form if needed, it is troublesome to specify the figure on a display screen by special operation each time, and to display a character.

[0003]There is the purpose of this invention in providing the map display device which displayed the character without carrying out special operation, when traffic information is received with the form of both a figure and a character.

[0004]

[Means for solving problem]This invention detects a self-vehicle position and displays it in piles on said road map while it displays a road map on a display monitor based on the map data stored in the map storage, The judging means which judges whether the traffic information which it was applied to the map display device which receives traffic information and was displayed on the display monitor, and was received is displayed on said display monitor as graphic information, When judged with graphic information being displayed by the judging means, the above-mentioned purpose is attained by providing the detailed displaying means which chooses the graphic information and carries out the character representation of the detailed content.

[0005]

[Mode for carrying out the invention]Drawing 1 is a block diagram of 1 embodiment of a map display device by this invention. It is a its present location sensing device with which 1 detects a present

location of vehicles in drawing 1, For example, the azimuth sensor 1a which detects an advancing azimuth of vehicles, the speed sensor 1b which detects the vehicle speed, GPS sensor 1c which detects a GPS signal from a GPS (Global Positioning System) satellite, etc. are comprised. 2 is a map storage memory which stores data about a flat-surface road map, for example, comprises CD-ROM and its read-out equipment. Road map data stored in the map storage memory 2 mainly comprises road data, name data, background data, etc. on a planimetric map.

[0006]3 is a control circuit which controls the whole equipment, and comprises a microprocessor and its peripheral circuit. 4 is an input device which has the various switches which input a destination of vehicles, etc., and it is allocated around a display screen in this example. Instructions may be sent out to a control circuit by wireless or WAIYADO as a remote control system. Details / broader-based switches 4a and 4b are switches for indicating the display map by detailed or giving a broader-based indication. In this example, a change to five steps was enabled from the maximum details to the maximum wide area, and, in the case of a bird's-eye view map display, height of a viewpoint is set as 350m, 700m, 1400m, 2800m, and 5600m to each stage, respectively. It may be for scrolling a display screen up and down, and the scroll switch 4c can use a switch of various forms, and what is called a joy stick may be sufficient as it. A scroll switch into which the looking-down direction is changed focusing on a its present location can also be formed, and a screen can be scrolled not only to a sliding direction but to a hand of cut in this case. The other map switch 4d and various switches which are not illustrated are formed in the input device 4, and various kinds of touch panel switches are further set up on the display monitor's 8 display screen by this embodiment.

[0007]5 is a memory for planimetric map data which stores the data for flat-surface road map drawing for seeing and displaying a flat-surface road map from right above, and is created based on the flat-surface road map data read from the map storage memory 2. 6 is a memory for bird's-eye view map data which stores the data for bird's-eye view map drawing for displaying a flat-surface road map by a bird's-eye view method, and is created based on the flat-surface road map data read from the map storage memory 2. 7 is an image memory which stores the image data for displaying on the display monitor 8 which mentions later, and this image data is created from the data for planimetric map drawing or the data for bird's-eye view map drawing, and the graphic data of the various traffic information mentioned later. The image data stored in the image memory 7 is read suitably, and is displayed on the display monitor 8.

[0008]As for 9, an FM multiplex broadcast receiving set and 10 receive the traffic information (it is hereafter called VICS information) to which a light beacon receiving set and 11 are radio wave beacon receiving sets, and are sent by the FM multiplex broadcast electric wave, the light beacon, and a radio wave beacon, respectively.

[0009]The VICS information explained in this Description is congestion information, regulation information, parking area information, service area information, and parking-area information. Lane regulation information, the lamp regulation information of a highway, and interchange regulation information are included in regulation information. Congestion information is divided for every vertical

level of a road, and it is red about traffic congestion and it displays [it is yellow about confusion, and is green, and] those without traffic congestion confusion.

[0010]Drawing 2 is a figure showing the picture which displays a road map by a bird's-eye view method, a map and a grid line are displayed and VICS information is not displayed. TM is a self-vehicle position mark displayed on the present location of vehicles. During a run, a map is not updated but only the part it ran moves self-vehicle position mark TM to the upper part from the reference position of drawing 2 until it carries out a prescribed distance run. If beyond prescribed distance runs, a screen will be updated and self-vehicle position mark TM will return to the reference position of drawing 2. R1 is a toll road (highway) and R2 is local streets, such as a national highway and a prefectural road.

[0011]As shown in drawing 2, the display monitor's 8 display rectangle is divided into four fields in this embodiment. Make the X axial direction of the display monitor's 8 display screen into 500 dots, and Y shaft orientations are made into 400 dots, When the lower left corner of a screen is made into the starting point of coordinates, the coordinates of Y shaft orientations the 1st field among four fields The range of 0-200 dots, the 2nd field -- in the coordinates of Y shaft orientations, the coordinates of Y shaft orientations make [the coordinates of Y shaft orientations] the range of 300-350 dots, and the 4th field the range of 350-400 dots for the range of 200-300 dots, and the 3rd field. And the 1st field - the 3rd field are made into a road map viewing area, and the 4th field is made into the empty viewing area.

[0012]When the viewpoint height at the time of creating bird's-eye view map data is fixed, in the 1st field. A bird's-eye view map is displayed by a big representative fraction in detail in the narrow field of the its present location circumference, a bird's-eye view map is displayed on the 3rd field by the coarsest small representative fraction in the large field of the point distant from the its present location, and a bird's-eye view map is displayed on the 2nd field by a middle representative fraction in the field of a middle size. The representative fraction in the 1st field - the 3rd field becomes small gradually as it keeps away from a its present location.

[0013]GH is a horizontal-grids line, GV is a bias grid line, and depth perception and a feeling of depth are expressed on a bird's-eye view map. Each grid line is displayed so that the distance on the road map between adjoining grid lines may become equal generally. Since a map scale will be missing from the upper part and will change from a screen lower part continuously if a road map is expressed as a bird's-eye view method, it becomes narrow gradually like a graphic display, applying the interval of horizontal-grids line GH to the upper part from the screen bottom. Similarly, the interval which applies the bias grid line GV to right and left from middle of the screen becomes narrow, respectively.

[0014]Drawing 3 is a flow chart which shows the main process of the control circuit 3, and explains operation of this embodiment based on this flow chart below. The control circuit 3 starts processing of drawing 3, when a key is operated by ignition on position. A recommended route and the destination are set up in Step S1 of drawing 3. The destination is set up by the operator via the input device 4, and a recommended route is automatically set up by the operation which used the well-known

Dijkstra method etc. In this case, the its present location can use the position detected with the its present location sensing device 1. Or the candidate of the recommended route is beforehand remembered to ROM etc., and either may be chosen from the inside as a recommended route.

[0015]Display screen mode is set up in Step S2. A mode which displays a bird's-eye view map, and a mode which displays a planimetric map are shown in display screen mode set up here, and an operator performs selection in these modes via the input device 4 or a touch panel switch. A display ring boundary is set up in Step S3. Display ring boundaries set up here include selection in a mode, etc. a foreground color of a screen, and night mode and daytime. An operator performs selection of these display ring boundary via the input device 4. In step S4, a present location of vehicles is detected based on a signal from the its present location sensing device 1. Map display processing which shows drawing 4 and drawing 5 details is performed, and a map is expressed as Step S5. Details of map display processing are mentioned later.

[0016]In Step S6, a its present location is detected like step S4. In Step S7, it is judged whether rewriting of whether the road map on a screen is updated and a road map is performed. Here, when vehicles run from the last map renewal time based on the detected current position beyond in prescribed distance, it judges with updating the road map by which a screen display is carried out. This screen update is called scrolling by mileage, and is distinguished from the screen scrolling by the scroll switch 4c.

[0017]If the judgment of Step S7 is affirmed, it will return to Step S5, and if a judgment is denied, it will progress to Step S8. In Step S8, it is judged whether the main process of drawing 3 is continued. For example, when the unillustrated electric power switch was turned off, or when the switch which stops processing is operated, the judgment of Step S8 is denied and the main process of drawing 3 is ended.

[0018]If the judgment of Step S8 is affirmed, after progressing to step S9 and updating the display of a self-vehicle position mark, it returns to Step S6. Although a self-vehicle position mark is displayed on the present location on a map in piles, in order to move a self-vehicle position mark on a map according to mileage until a map is scrolled by prescribed distance at Step S7, the display of a self-vehicle position mark is updated. Other attached information is also updated at this step.

[0019]Drawing 4 is a flow chart which shows the details of bird's-eye view map display processing among map display processings of Step S5 of drawing 3. In Step S201, the display direction angle at the time of carrying out a map display by a bird's-eye view method is calculated. In Step S202, the road map data of the its present location circumference is read from the map storage memory 2 based on the display direction angle calculated at the present location and Step S201 which were detected by step S4 of drawing 3, or S6. For example, road map data of several 10 km around containing a its present location is read.

[0020]In Step S203, the data used when displaying a bird's-eye view map out of the road map data read at Step S201 is chosen, and selected data is stored in the memory 6 for bird's-eye view map data. Here, in order to reduce the data volume of the road map information displayed on the display

monitor 8, a data type extracts only the data which fulfills predetermined conditions, and stores in the memory 6 for bird's-eye view map data. In Step S204, road map data selected at Step S203 is changed into bird's-eye view map data. Data conversion adopts the system by a well-known bird's-eye view method. In Step S205, the bird's-eye view map data changed at Step S204 is changed into the final map image data for displaying on the display monitor 8. If judged with it being a VICS information display mode at Step S209, it will progress to Step S206, otherwise, if judged, it will progress to Step S207. In Step S206, the graphic information of the VICS information mentioned later is changed into map image data. Map image data and VICS graphic image data are stored in the image memory 7, and the picture is expressed to the display monitor 8 as Step S207 in Step S208. [0021]When displaying, if it is a VICS information display mode, VICS text will be displayed on a map and VICS graphic information in piles. Since data offer time is contained in VICS text at this time, that data offer time is displayed on the upper part of a screen, and it reports that a display screen is a VICS information display mode. A background color etc. are switched so that it may mention later according to VICS information display-mode selection and non selection.

[0022]Drawing 5 is a flow chart which shows the details of planimetric map display processing among map display processings of Step S5 of drawing 3. In Step S301, the road map data of the its present location circumference detected by step S4 of drawing 3 or S6 is read from the map storage memory 2. For example, road map data of several 10 km around containing a its present location is read.

[0023]In Step S302, the data used when displaying a planimetric map out of the road map data read at Step S301 is chosen, and selected data is stored in the memory 5 for planimetric map data. In Step S303, road map data selected at Step S302 is changed into the planimetric map data for displaying on the display monitor 8. If judged with it being a VICS information display mode at Step S307, it will progress to Step S304, otherwise, if judged, it will progress to Step S305. In Step S304, the graphic information of the VICS information mentioned later is changed into map image data. Map image data and VICS information image data are stored in the image memory 7, and the picture is expressed to the display monitor 8 as Step S305 in Step S306. When displaying, if it is a VICS information display mode, VICS text will be displayed on a map and VICS graphic information in piles. Since data offer time is contained in VICS text at this time, that data offer time is displayed on the upper part of a screen, and it reports that a display screen is a VICS information display mode.

[0024]Drawing 6 - drawing 22 explain VICS information display processing in detail. The following display control is performed in this embodiment. The display control by the function which the operator chose arbitrarily, and the display control which equipment itself performs suitably occur.

[0025]** By a congestion information thinning display control bird's-eye view map display, although all the VICS information is displayed on the 1st and 2nd fields of a screen, a red congestion information pilot wire in which a congested road is shown is shown in the 3rd field. Therefore, other VICS information is not displayed on the 3rd field. This secures the conspicuousness of a screen.

[0026]** Make selectable four kinds of modes in the mode which displays only the VICS information about the mode and toll road which display only the VICS information about the mode and local street

which display all the VICS information about a display-mode selection display control toll road and a local street, and the mode which does not display VICS information. Thereby, VICS information can be displayed if needed and operativity and visibility improve.

[0027]** When VICS information detailed display control regulation information and parking area information are in a display map and a detailed information display mode is chosen, while surrounding one of information by a square frame, carry out the character representation of the contents of regulation, empty information on a motor pool, etc. which are details of the surrounded information. When there is two or more these information, regulation information can be given priority to and displayed, and it can choose in order with an item selecting switch.

[0028]** Display VICS information offer time in a screen, report that it is a VICS information screen, and, thereby, make congestion information always grasp certainly in the screen which displays VICS information display discrimination expression control VICS information.

[0029]** Change how to use the color in the screen when not displaying background color change display control VICS information with the case where VICS information is displayed, and display congestion information clearly on a road map. For example, about a background color, it is considered as blue system gray reddish gray and with a VICS information display without a VICS information display. If you have no VICS information display about a road color, although green and the local street I are sour oranges, a national highway red, a prefectural road, and a principal prefectural road, With a VICS information display, all are made into black system gray, and about a minor street, it brings close to black system gray and the blue system gray which is background colors with a VICS information display without a VICS information display. a toll road -- those with a VICS information display ---less -- also carrying out -- it displays in blue. About a green tract of land, it is considered as the gray system which dropped mist and chroma saturation green and with the VICS information display from the background color without a VICS information display.

[0030]** In a planimetric map display, according to a representative fraction of a map, separate from a road and display a display position of congestion information pilot-wire width change display control congestion information pilot wire, so that a representative fraction is large. In the case of a bird's-eye view map display, according to detailed wide area selection, it separates from a road and displays, so that it becomes a detailed display. Thereby, in a case where a representative fraction is small, or a broader-based display, congestion information pilot wire is made not to be mistaken for other roads.

[0031]** When displaying interpolation display control traffic congestion pilot wire of congestion information pilot wire along a road, prevent carrying out interpolating calculation and becoming a discontinuous display, and make it cross in neither a crossing nor a part of a curve.

[0032]Although display control ** of a more than is performed only in bird's-eye view map display mode, it is similarly performed by planimetric map display mode except it.

[0033]Hereafter, each display control of the above-mentioned ** - ** is explained. If the map switch 4d is operated from a VICS-information-display-less screen of drawing 2, it will become a display screen of drawing 6, and if the VICS display touch panel switch 8a is operated, it will become a display

screen of drawing 7 here. An all-prefectures name and offer time which provide VICS information are displayed on the top viewing area D1 of a screen of drawing 7. The local street information touch panel switch 8b and the toll road information touch panel switch 8c are displayed on the screen bottom. A VICS information display as shown in drawing 8 according to an on-off state of these touch panel switches 8b and 8c is chosen.

[0034]In drawing 7, the indicator 8d is formed in the local street information touch panel switch 8b, the indicator 8e is formed in the toll road information touch panel switch 8c, and if one [each switches 8b and 8c], each indicators 8d and 8e will be green, and will be turned on.

[0035]Drawing 9 is a flow chart which shows VICS information display processing. If the display mode of VICS information is judged at Step S21 to be local street information mode, local street VICS information will be read from a memory at Step S22, If the display mode of VICS information is judged at Step S21 to be toll road information mode, toll road VICS information will be read from a memory at Step S23. Processing treatment is performed in order to display such VICS information on the monitor 8 at Step S24. It is judged also with the display mode of VICS information not being toll road information mode or local street information mode, either at Step S21, And if judged with the mode which displays the both sides of local street VICS information and toll road VICS information in Step S25, local street VICS information and toll road VICS information will be read from a memory at Step S26, and it will progress to Step S24. When Step S25 is denied, it is a mode which does not display VICS information and returns, without carrying out VICS information display processing of a graphic display.

[0036]Drawing 10 is a detail flowchart of processing treatment of VICS information of drawing 9. Along with a link which expresses a road with Step S31 according to details / broader-based level, or a representative fraction, the starting point and a terminal point of a line of the two upper and lower sides are calculated. In Step S32, based on received congestion information, the traffic congestion section, the confusion section, and the traffic-congestion-confusion-less section are specified about each of a calculated line, and data of congestion information pilot wire is created by adding colour information which shows each a grade of traffic congestion.

[0037]In Step S33, an indicative data is created based on parking area information, regulation information, service area information, and parking-area information which were received.

[0038]In a VICS-information-display-less screen and drawing 11, a VICS information display screen of a local street and drawing 12 are [drawing 2 / a VICS information display screen of a toll road and drawing 13] the VICS information display screens of a toll road and a local street.

[0039]In drawing 11, the congestion information pilot wire U and L is displayed on both the sides of the local street R2. The pilot wire U goes up, the pilot wire L gets down from congestion information of a lane, and congestion information of a lane is expressed. An entire interval of the point P1, P2, P3, and P4 is displayed in the 1st field and the 2nd field in the same yellow (in drawing 11, an alternate long and short dash line shows) also as the up-and-down pilot wire U and L, when a vertical level is crowded, but it is not displayed on the 3rd field as a vertical level, either, but priority is given to

conspicuousness of a screen. Since a road, the name of a place, etc. which should be displayed exist in a method of the screen back mostly, in order to control hard to see [of a display by information data increasing in number further] as much as possible, in the 3rd field, a display of confusion pilot wire and a traffic-congestion-confusion-less pilot wire is omitted. From the same meaning, neither regulation information nor other VICS information are also displayed on the 3rd field. Mark PM which shows a motor pool is displayed on the 1st field.

[0040]In drawing 12, the congestion information pilot wire U and L is displayed on both the sides of the toll road R1. When a going-up lane of an entire interval of the point P5, P6, P7, and P8 was congested, it gets down and a lane is crowded, a traffic congestion display of red (a dashed line shows in drawing 12) of the traffic congestion pilot wire U of an uphill lane is displayed on the 1st field, the 2nd field, and all the 3rd field. On the other hand, it gets down, and about the traffic congestion pilot wire L of a lane, it does not display but, as for a traffic congestion display of yellow (drawing 12 alternate long and short dash line) of the 3rd field, only the 2nd field and the 1st field perform a yellow (drawing 12 alternate long and short dash line) confusion display. This is based on the same Reason as the meaning of drawing 11.

[0041]In the case of a VICS information display mode of a local street and a toll road, as a display screen is shown in drawing 13, all drawing 11 and drawing 12 are displayed. Although thinning processing of congestion information pilot wire is not performed in a planimetric map display mode, others are the same as that of bird's-eye view map display mode.

[0042]It is a toll road, a highway, and a national highway, and, as for a road displayed on the 3rd field of a screen by a bird's-eye view map display, a road display is also performing thinning processing. A name etc. are restricted to an all-prefectures name, a city name, etc. Therefore, by thinning processing which a VICS information display described above, even if these thinning processings, imposed display processings, and intervals display VICS information, they make a map display of the 3rd field legible.

[0043]Drawing 14 (a) and (b) explains the display of the detailed information display mode of VICS information, and shows the case where lane regulation information VR and parking-area-information PM exist in a display screen. When the detailed information display touch panel switch (un-illustrating) set up on the monitor 8 is operated, as first shown in drawing 14 (a), lane regulation information VR is surrounded by square frame FR, and the character M1 of lane regulation and the regional name M2 to which lane regulation is carried out are displayed on the field D2 under a screen.

[0044]If the touch panel switch 8f of the item selection set up on the screen is operated to know the details of motor pool PM, it will become a display screen shown in drawing 14 (b). That is, motor pool PM is surrounded by square frame FR, and the character M3 of a motor pool name and the character M4 of full parking lot are displayed on the viewing area D2 under a screen. If the touch panel switch 8g of the end set up on the screen is operated, according to a display mode, it will return to the screen of either drawing 2, drawing 11 - drawing 13.

[0045]Drawing 15 is a flow chart at the time of detailed information display-mode selection of VICS information. If judged with regulation information being in a display screen at Step S41, it will progress to Step S42 and any one regulation information will be surrounded by a square frame. Subsequently, at Step S43, the character representation of the detailed information of the surrounded regulation information is carried out. If judged with the item selecting switch 8f having been operated at Step S44, it will return to Step S41. If operation of the end switch 8g is judged at Step S45 when not operated, when this processing will be ended and operation of the end switch 8g will not be judged, it returns to Step S44. If judged with there being no regulation information at Step S41, it will progress to Step S46. If judged with there being parking area information at Step S46, one parking area information will be surrounded by a square frame by Step S47, the character representation of the motor pool name and information on full parking lot or a vacant taxi will be further carried out in Step S48, and it will progress to Step S44. If Step S46 is denied, it will progress to Step S45.

[0046]The same display is possible if a detailed information display mode is chosen at the time of a bird's-eye view map display.

[0047]Drawing 16 is a figure which illustrates congestion information pilot wire in detail. In drawing 16, the national highway R3 is displayed with width which is two lines (hatching shows), and the congestion information pilot wire U and L is displayed on both the side. The prefectural road R4 is expressed as one line, and the congestion information pilot wire U and L is displayed on both the side. That is, according to a case where it is expressed with a case where a road is expressed with one line, and two lines, creation systems of congestion information pilot wire differ somewhat. A traffic congestion place is red (a dashed line shows in drawing 16), and, in a confusion part, the congestion information pilot wire U and L displays yellow (in drawing 16, an alternate long and short dash line shows), and a traffic-congestion-confusion-less part in green (a two-dot chain line shows in drawing 16).

[0048]Although it mentioned above having changed the interval with the line which shows congestion information pilot wire and a road according to the rate of a map scale, the example is shown in drawing 17 and drawing 18. (a) shows only a road and, as for (b), in 1/80000 of cases, (c) shows 1/10000 of cases, respectively. For example, in the representative fractions 1/10000, 4 dots is separated from the line R3 of a road map, and R4 on a screen, 3 dots is separated from the line R3 of a road map, and R4 on a screen (un-illustrating), and 2 dots is separated from the line R3 of a road map, and R4 on a screen by the representative fractions 1/80000 by the representative fractions 1/20000 and 1/40000.

[0049]Next, the creation procedure of congestion information pilot wire is explained. One road as map data is defined by two or more lines which each calls the link which has a node to the starting point and a terminal point. A beginning point node and a terminal node have a coordinates position, respectively, and the link which connects the meantime has road class information. Fundamentally, the offset value (shifting quantity) of the direction of X or the direction of Y is added or subtracted to the position coordinate of a node, and the line which connects the starting point (offset node) and the

terminal point (offset node) after offset turns into congestion information pilot wire. The size of an offset value and a direction are determined as follows.

[0050]The X-axis and a Y-axis define the two-dimensional flat surface which displays a map like drawing 19 (a), and a counterclockwise rotation is defined as the degree of positive angle around the starting point O. When inclination of a link is less than 45 degrees, congestion information pilot-wire Ua-Lb is made to offset in the direction of Y, as shown in drawing 19 (b) and (c), and congestion information pilot-wire Uc-Ld is made in the case of 45 degrees or more, to offset in the direction of X, as shown in drawing 19 (d) and (e). An offset amount is determined that it will separate from a road by 2 dots - 4 dots on a screen according to the rate of a map scale as mentioned above. In drawing 19 (b) - (e), L1-L4 express a link, N1-N4 express a node, and the offset node which Ua and Uc went up, Lb and Ld got down from the traffic congestion pilot wire of the lane, and ON1 a-ON 4b made offset each node for the traffic congestion pilot wire of a lane is shown.

[0051]Although congestion information pilot wire is determined as mentioned above, as shown in drawing 20, when the links L1 and L2 intersect perpendicularly, the traffic congestion pilot wire Uc and Ua of an uphill lane will separate between offset node-on4a and ON1a. It will get down and the traffic congestion pilot wire Lb and Ld of a lane will cross.

[0052]Then, the following processings are performed, a left line is connected and a crossing portion of a crossing line is eliminated. In drawing 21 (a) and (b), it asks for the intersection UX of the traffic congestion pilot wire Ua and Uc of a line headed for Tokyo, a line which connects the intersection UX and offset node-on3a is made into traffic congestion pilot-wire Uc' of a new line headed for Tokyo, and a line which connects the intersection UX and offset node-on2a is made into traffic congestion pilot-wire Ua' of a new line headed for Tokyo. On the other hand, it gets down and asks for the intersection LX of the traffic congestion pilot wire Lb and Ld of a lane, and it gets down, and is considered as traffic congestion pilot-wire Ld' of a lane, and the new line which connects the intersection LX and offset node-on2b is made into traffic congestion pilot-wire Lb' of a new going-down lane for a line which connects the intersection LX and offset node-on3b. Data of congestion information pilot wire which continued according to a connectable state of a link by such correcting operation can be created.

[0053]As shown in drawing 22 (a), when the offsetting directions of the links L1 and L2 connected continuously differ in the direction of X, and the direction of Y, as shown in drawing 22 (b) or (c), such interpolating calculation, The offsetting direction of the links L1 and L2 connected continuously is needed when direction of the link L2 is reversed, even when it is the same. Therefore, interpolating calculation is unnecessary when the offsetting direction of the links L1 and L2 and direction which are connected continuously are also the same, as shown in drawing 22 (d) and (e).

[0054]

[Effect of the Invention]The detailed content of a figure can be made to know according to this invention, without carrying out special operation, since it was made to carry out the character representation of the detailed content while choosing one of them, when the figure of traffic

information was displayed on the display screen.

[Translation done.]